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Anticipating water infrastructure renewal

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Anticipating water infrastructure renewal: A framing perspective on organizational learning in public agencies

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Abstract

Water authorities in Western countries are increasingly confronted with waterway renewal. Ageing waterway infrastructures put the reliability of the existing network under pressure. Similarly, they open up the need to anticipate long-term uncertainties to ensure network performance. Aligning organizational practices to this new context can be considered an organizational learning process, which concerns improving current practices as well as reconsidering underlying values. Against the background of public management reforms, we aim to understand the organizational learning process in a case study of the Dutch authority Rijkswaterstaat, which is facing a major waterway renewal challenge. By developing a framing perspective on organizational learning, our analysis theoretically provides more insight into agencies anticipating change and empirically into waterway renewal in practice. Our research demonstrates that waterway renewal is primarily framed from a New Public Management viewpoint in which change is approached rather pragmatically. Accordingly, we observed a refinement of existing practice that protects the agency's mission. Higher levels of learning were discarded as potentially disruptive to waterway management, leaving more fundamental change untouched. We therefore question to what extent water authorities are capable of fully addressing waterway renewal. Nevertheless, the repositioning process resulted in opportunities for reflecting on dominant frames and introducing new concepts. To better seize such opportunities and thus improve alignment to waterway renewal, water authorities can, in addition to improving existing practices, re-interpret dominant frames and construct a new narrative in which future, long-term uncertainties are acknowledged as inherent conditions for agencies to cope with.

Keywords

Organizational learning, infrastructure renewal, framing, New Public Management, water management

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Introduction

Water authorities responsible for the planning and management of inland waterway infrastructure are increasingly faced with the issue of renewing their networks. In Western countries, major parts of the waterway network, such as navigation locks, bridges, and weirs, are ageing and need to be replaced to ensure waterway performance (Gil and Beckman, 2009; Hijdra, 2017; IMF, 2014; OECD, 2014). Following Kanter (2015), rather than finding ways to *develop* infrastructure systems, water authorities are searching for ways to *re-develop* these systems. Waterway renewal can be considered a critical moment in time for assessing whether to maintain or transform the functionality of the waterway network (cf. Frantzeskaki and Loorbach, 2010). It is the moment to incorporate more strategic, yet also more uncertain insights related to, for example, socio-economic developments (translated into new waterway demands) and climate change (affecting waterway performance) into the network (Bolton and Foxon, 2015; Malekpour et al., 2015). Waterway renewal thus seems to create a new, unfamiliar context for water authorities that they have to anticipate.

At the same time, recent public management reforms have an impact on water authorities' practices (Brown et al., 2011). On the one hand, the emergence of New Public Management (NPM) since the 1980s has led to public authorities adopting management tools from private business to improve their effectiveness and efficiency and to create more accountable and service-oriented public agencies (Hood, 1991; Osborne and Gaebler, 1992; Pollitt and Bouckaert, 2011). On the other hand, there is growing recognition of long-term uncertainty in the organizational environment, which calls for authorities capable of dealing with change (Staber and Sydow, 2002). Anticipating change requires adaptive governance approaches that encompass long-term uncertainty and surprises (Pahl-Wostl, 2009). For instance, Rijke et al. (2014) propose more programmatic and collaborative structures that provide more space for dealing with change. For water authorities, these reforms imply maneuvering between becoming effective and efficient and becoming adaptive and flexible at the same time. These ambitions, however, are at odds with each other: while NPM aims to control or reduce uncertainties as they might hamper performance, becoming adaptive seems instead to favor approaches that acknowledge and embrace uncertainties (Eakin et al., 2011).

Balancing between reforms influences the course of water authorities in developing ambitions and strategies for addressing waterway renewal. The process of authorities familiarizing themselves with waterway renewal can be operationalized as a process of environmental alignment (Fiol and Lyles, 1985). The extent to which water authorities are aligned to their environment impacts organizational performance. Nevertheless, organizational environments are not stable, but change through time. This means that authorities continuously have to (re-)interpret their environment and take subsequent actions to ensure environmental alignment. In line with authors such as Senge (1990), Weick (1995), and Berkhout et al. (2006), this process of environmental alignment can therefore be considered as a process of organizational learning. It includes both single-loop learning, in which existing practices are modified, and double-loop learning, which involves a reconsideration of existing frames and missions to a new context (Argyris and Schön, 1974). It is expected that organizations that demonstrate both types of learning will be more successful in aligning themselves to a new environment (Tosey et al., 2012).

In this article, we aim to understand the organizational learning process that water authorities follow to align themselves to a new context of waterway renewal. We expect this learning process to be conditioned by dominant public management reforms, such as the

forementioned NPM. We adopt a framing perspective to understand how public agencies as collective entities interpret and re-interpret their environment and take appropriate actions. As Dunlop and Radaelli (2013: 608) argue, learning is contingent on how water authorities frame the issue at stake. To illustrate, when waterway renewal is framed as an operational issue, this might lead to more single-loop learning, whereas if renewal is framed as a strategic issue this might lead to more reflexive, double-loop learning. As such, by applying frame analysis to study organizational learning, we contribute toward developing concepts to understand how public agencies operate and learn in a context of change and dynamism (cf. Bosomworth, 2015). Empirically, we focus on waterway renewal in the Netherlands. The Dutch inland waterway network is operated by the executive national water authority *Rijkswaterstaat*. As the current network has been developed since the late 19th century, ageing infrastructure is becoming a pressing issue that requires “novel ways of working and novel insights” (RWS, 2014: 7; see also Deltaprogramma, 2012; I&M, 2012; RWS, 2012). Moreover, Rijkswaterstaat, well known for its technical-engineering management style that has, for instance, resulted in the Dutch Delta Works (Lintsen, 2002), provides an interesting case as it has recently been repositioned as a public-oriented waterway network manager (Arts et al., 2016; Van den Brink, 2009). Our case study is focused on the € 3 billion Program on Navigation Locks (in Dutch: *Sluizenprogramma*), which is one of the first Dutch waterway renewal programs.

The paper is structured as follows: the concepts of environmental alignment and organizational learning are explained in the second section. Based on the notion of organizational learning as a change in the shared understanding of the problem to be tackled, which can also be seen in the subsequent developed strategies, our theoretical section will also explain frame analysis to study organizational learning. The third section builds on this conceptualization by presenting a methodology for analyzing framing processes and the related action strategies. In this section, we also introduce our case study of the Program on Navigation Locks of Rijkswaterstaat. The fourth section shows our main findings of the organizational learning processes in our case study and its influence on approaching waterway renewal, structured around two frames that have been developed. In the fifth section, we put this organizational learning process in perspective by relating it to the challenge for water authorities of navigating amid contrasting public management reforms. The sixth and final section presents our conclusions as well as implications for public agencies operating in a context of change and dynamism.

Environmental alignment: A process of organizational learning

Organizational learning as shared meaning making

As discussed by Tosey et al. (2012), changes in organizational environments are expected to trigger learning processes in organizations. According to Weick and colleagues (Daft and Weick, 1984; Weick, 1995; Weick and Westley, 1996), such learning processes are to be seen as acts of sense-making and of creating shared interpretations of the context and the role of organizations play therein. In this conceptualization, “the interpretative and ‘constructed’ nature of the external environment” is highlighted (Nicolini and Meznar, 1995: 730). This understanding of organizations, rooted in social constructivism, is concerned with the construction of interpretations by organizations as collective entities (Argote, 2011; Easterby-Smith et al., 2000; Grin and Loeber, 2007; Rashman et al., 2009).

In this perspective, learning is conceptualized as a shared meaning-making process. The central notion is the idea that learning occurs through conversations and interaction (Weick and Westley, 1996). Organizational learning becomes a joint sense-making process

in which individuals in organizations mutually scan the environment, interpret it, and develop according actions (Daft and Weick, 1984). The construction of shared frames on how organizations comprehend the world steer the organization's course of action (Kim, 1993). Following this line of thought, Cook and Yanow (1993) argue that organizations are built up through a history of joint action and practice. These practices are the result of an inter-subjective meaning-making process expressed through artifacts such as language, objects, and acts (Yanow, 2000). Together, organizational practices can therefore be understood as cultures (Cook and Yanow, 1993). Likewise, "learning can be understood in terms of continuity or discontinuity of [organizational] practices over time" (Grin and Loeber, 2007: 214).

Frame analysis as a means to understand organizational learning

To operationalize this interpretivist understanding of organizational learning, frame analysis helps to get a grip on (changes in) organizational frames and practices. Frames are "schemata of interpretation" and operate as frameworks of understanding (Fünfgeld and McEvoy, 2014; Goffman, 1974). Schön and Rein (1994) have applied frame analysis to the context of public policy-making. This approach can be extended to address administrative issues, since Schön and Rein's approach can be considered sense-making work (Van Hulst and Yanow, 2016).

In this understanding of frame analysis, we can distinguish two key elements. First, there is the construction of the frame in which a water authority presents itself. Central concepts are defined in a process of meaning-making (Cook and Yanow, 1993; Weick, 1995). After Argyris and Schön (1974), examples of central concepts can be "emphasize rationality" or "internal commitment." These concepts are sequenced in such a way that they become a distinct story—a coherent story in which a shared problem is identified and a solution is proposed (Schön and Rein, 1994). Second, organizations also draft an action strategy to translate the frame into practice. As such, frames do not only describe how organizations perceive the world but also influence how agencies act (Schön and Rein, 1994). Frames guide action, leading to specific goals (Dunlop and Radaelli, 2013). The action strategy is presented as a solution for tackling the identified problem.

The outcomes of the developed frames and action strategies are continuously contested and verified in practice. This is a vital element of organizations; they continuously have to "act and enact their environment" (Nicolini and Mezner, 1995: 738; see also Cook and Yanow, 1993; Weick and Westley, 1996). In the intersubjective reconstitution of organizational artifacts (such as language, practices, objects), a distinction is typically made between changes in these artifacts on two levels (Figure 1) (Cope, 2003; Fiol and Lyles, 1985). Argyris and Schön (1974) conceptualize a lower-level, more routine-based form of reconstituting organizations as single-loop learning; higher-level, more conceptual reflections on organizational values are termed double-loop learning (Cope, 2003).¹ Single-loop learning entails reconsideration and modification of the chosen action strategy, which is considered a more operational feedback loop (Edmondson and Moingeon, 1996). According to Cope (2003), single-loop learning is primarily oriented toward adjusting prevailing practices. Double-loop learning, in contrast, concerns a re-examination of the values underlying these practices, for instance seen in a change of organizational objectives. As such, double-loop learning reflects on the frames at play and proposes alterations to them (Schön and Rein, 1994), which is generally considered to be more conceptual than single-loop learning. Double-loop learning often occurs due to a profound change in organizational environments (Tosey et al., 2012). To illustrate, Pahl-Wostl (2009) and

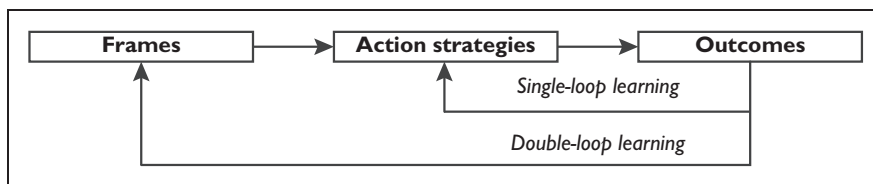


Figure 1. Learning presented as two feedback loops (Argyris and Schön, 1974; Pahl-Wostl, 2009).

Brown et al. (2011) consider the refinement of existing management systems in the water sector as single-loop learning, whereas the adoption of a new management system (such as Integrated Water Resources Management) is regarded double-loop learning. The feedback loops (Figure 1) demonstrate that the framing process is a dynamic process. Frames are thus far from static; rather, they continuously evolve.

While frames evolve, it is important to remember that, at the same time, organizations are often inclined to keep existing frames as unquestioned (Argyris and Schön, 1974; Staber and Sydow, 2002). As Kamkhaji and Radaelli (2017) argue, critical reflection—an important part of double-loop learning—is not a typical response for organizations dealing with change and uncertainty, since it can be disruptive to the organization. This seems to point toward organizations that favor the optimization of existing practices, avoiding a more critical “frame reflection” (Bosomworth, 2015; Schön and Rein, 1994). Organizations as collective entities strategically select and highlight certain elements in a frame, whereas at the same time, they intentionally neglect or downplay other elements (Entman, 1993). Framing, and hence learning, then also become a strategic and political exercise (Van Hulst and Yanow, 2016).

Previous research in the field of water management has shown how the construction of frames and action strategies is influenced by prevailing public management approaches, of which NPM in particular has gained currency (Farrelly and Brown, 2011; Furlong and Bakker, 2010; Van den Brink, 2009). Part of a neoliberal turn in the public sector, NPM advances to make government more efficient and consumer-oriented through the incorporation of business values and methods (Bevir et al., 2003; Hood, 1991; Osborne and Gaebler, 1992; Pollitt and Bouckaert, 2011). To illustrate, Bevir et al. (2003) demonstrate that, by importing NPM principles, frames developed by governments are likely to prefer procedural over substantive issues, reflected, for instance, in central concepts such as “value for money” and the emphasis on attaining specific performance levels. In achieving such standards, NPM-related action strategies lead to what Rhodes (1994) has described as a “hollowing out of the state,” since public tasks are either outsourced to private companies or executed in a business-like manner (e.g. through the division of public organizations into specific units each with clear targets). Despite its promises and widespread use, empirical research presents mixed results of public governments adhering NPM (Diefenbach, 2009).

Method

Our case study concerns the Dutch national water authority Rijkswaterstaat, which, among other things, is responsible for the operation of the national inland waterway network (e.g. the rivers Rhine and Meuse, and several main canals; Figure 2). Rijkswaterstaat faces a major water infrastructure renewal challenge, which is addressed in several programs and projects. The agency recognizes the need for a novel approach to address waterway

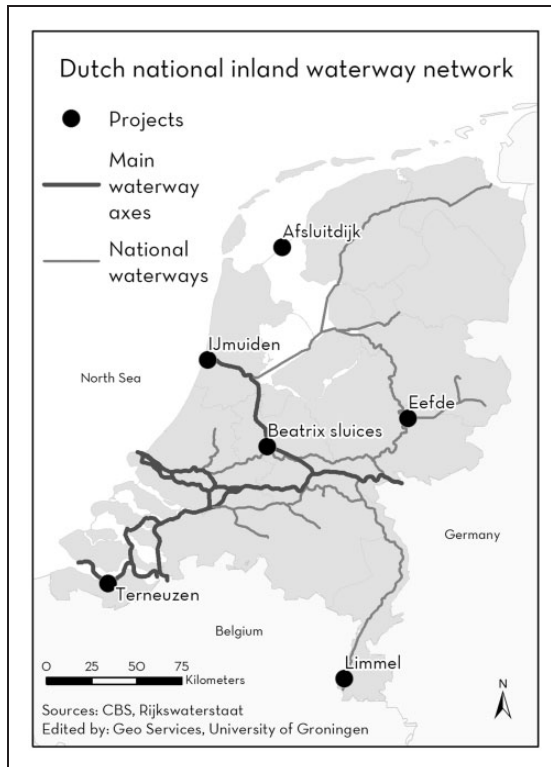


Figure 2. The Dutch national inland waterway network and the location of the six projects.

renewal, which could challenge current ways of working (RWS, 2014). As such, it involves a reconsideration of the organization's core mission and strategy. Rijkswaterstaat, an agency dating back to 1798, is a powerful actor in Dutch water management and infrastructure planning (Glasbergen and Driessen, 2005; Lintsen, 2002). As Lintsen (2002) states, the independently operating agency of Rijkswaterstaat originally had a strong technical-engineering background, with a strong “esprit de corps.” More recently, in 2004, the organization was repositioned as an executive agency (in Dutch: *agentschap*) of the Ministry of Infrastructure & the Environment with more narrowly defined tasks (Van den Brink, 2009). Since then, the Ministry has become responsible for water and infrastructure policies, and Rijkswaterstaat has become responsible for the execution of these policies.

The most notable waterway renewal program is the Program on Navigation Locks (*Sluizenprogramma*). This program was launched in 2012 and consists of six projects. Each project relates to a single one of the navigation locks, scattered across the Netherlands (Figure 2). Together an investment of approximately € 3 billion was made to upgrade the waterway assets. Five of the six projects (Limmel, IJmuiden, Beatrix sluices, Eefde, Afsluitdijk) were tendered to private companies with a Design, Build, Finance and Maintain (DBFM) contract, unique in the global water infrastructure sector. The program team consists of a program director and the six project managers. Exploratory interviews with three senior officials from Rijkswaterstaat on the issue of waterway renewal in the Netherlands earmarked the Program on Navigation Locks as a key example of waterway renewal in practice.

Data collection and analysis

The analysis of the framing process is based on an iterative, qualitative research strategy. By combining in-depth interviews, participatory observations and an analysis of secondary documents, we reconstructed the framing process within Rijkswaterstaat. Asked about organizational changes, interviewees identified two periods of time that have structured our analysis. Interviewees mentioned that becoming an executive agency in 2004 has led to a strategic repositioning of Rijkswaterstaat, which is reflected in the development of a new frame. The launch of the Program on Navigation Locks in 2012 was marked by interviewees as a reconsideration of this developed frame. Our frame analysis therefore covers two periods of time: the period from 2004 to 2012 and from 2012 onward.

The framing process in the time period 2004–2012 is based on 11 interviews with key officials in the Dutch water infrastructure sector to provide insight into how Rijkswaterstaat operates, in particular its construction divisions (Table 1 in Appendix 1; see also [Willems & Busscher, 2014]). For the time period 2012–current, we conducted another 11 interviews with officials mainly related to the Program on Navigation Locks from both the public and private side (Table 1, Appendix 1). All interviews were audio-recorded and fully transcribed. Summaries of the interviews were sent to interviewees for confirmation. In addition to the interviews, 13 meetings of the Program on Navigation Locks were visited in the period April–August 2015 and January–April 2016 (Table 2, Appendix 1). The first author participated in biweekly program team meetings and in several meetings with private companies (such as consultation rounds and the so-called “platform meetings”). Observations gathered during these meetings were recorded in a digital diary and used for the analysis. They allowed for more in-depth interpretations of the interviews collected, and for the translation of interpretations and strategies into practice.

We analyzed our data by looking for central concepts in each frame as well as for the strategy developed to put the central concepts into practice. The interview transcripts were coded in the Atlas.ti computer program (version 7.0). We identified two main family codes: central concepts and action strategies. Regarding central concepts, we looked for terms related to mission, ambitions, and aims. We specifically asked interviewees what role the public agency of Rijkswaterstaat, private parties and other stakeholders should play in this. Strategies were subsequently coded through looking at the operationalization of central concepts. For instance, interviewees who mentioned that knowledge sharing is an important central concept were asked to give examples of how this was enhanced. The interviews also allowed for reflection by the interviewees on their belief systems and practices, leading to the identification of barriers of putting the distinguished frame into practice. Secondary data (policy documents and newspaper articles) were used to triangulate the reconstructed frames (Table 3, Appendix 1). Comparing the aims and strategies in the two time periods, we were able to identify a repositioning process.

The repositioning of Rijkswaterstaat: Moving from a managerial frame toward a partner frame

For the time periods distinguished (2004–2012 and 2012–current), we have examined central concepts and action strategies on two levels: (1) the construction of the overall water authority’s frame and (2) the translation of this frame in waterway renewal practice.

A managerial frame on renewal

The rise of the managerial frame (2004–2012). As Van den Brink (2009) describes, Rijkswaterstaat's dominant position in Dutch water management had been increasingly challenged since the early 2000s. The agency felt as if it had to "reinvent" itself to ensure its continued existence by reconsidering its powerful, technical way of working. In line with its repositioning as an executive agency, Rijkswaterstaat reframed itself in its former Business Plan (e.g. RWS, 2011) as a public-oriented network manager of the Dutch national inland waterway network (*hoofdvaarwegennet*). The engineering-driven approach favored in previous decades was adjusted to a more managerial approach with a focus on effectiveness and efficiency (Van den Brink, 2009).

In this repositioning process from 2004 onward, a managerial frame was constructed in which interviewees distinguished two central concepts: reliability and cost-effectiveness (Figure 3). First, the Ministry holds Rijkswaterstaat accountable for the reliability of the inland waterway system. For example, interviewees mentioned that hydraulic works should be available for shipping for 98% of the time. To ensure this high service level, public works such as navigation locks and weirs that need to be upgraded become distinct projects within the organization. The delivery of these projects is a central concern, which has put a lot of emphasis on a narrowly defined project scope. For example, a representative of the Water Top Team, a public–private organization representing the interests of the water sector, stated that "*if someone looks beyond the project, he will only hear what risks he takes*" (#7).² Put differently, the scope is sacred. Project delivery has to be ensured in order to safeguard a high service level. One of the results is a risk-averse culture, in which proven solutions are preferred "to play it safe."

Second, Rijkswaterstaat operationalized the ambition to operate as a compact and flexible agency into the central concept of ensuring cost-effectiveness (RWS, 2011). For instance, a Rijkswaterstaat project manager referred to this as "*not reinventing the wheel, not making the same mistakes twice. We should use our capacity efficiently*" (#19). As such, it demonstrates a "managerial turn" taken by the waterways divisions within Rijkswaterstaat that is directed toward efficiency and effectiveness.

The two central concepts made Rijkswaterstaat formulate two action strategies. The first action strategy reflects on how the scope of waterway projects directs discussions. Guaranteeing reliability and cost-effectiveness, the projects should be neat and manageable. Thus, the scope is narrowed down to clear targets and measurable outputs echoing NPM thought. Interviewees argued that this is nothing more than "logical" to them, as they are a public agency using tax payers' money. Second, by clearly defining the project scope, Rijkswaterstaat could outsource tasks such as the design, construction, and maintenance of public works to private companies as much as possible. To this end, Rijkswaterstaat adopted the motto "the market, unless" (*de markt, tenzij*). This neoliberal shift is expected to give private companies more responsibilities resulting in a more innovative and efficient execution of projects. The technical responsibilities were deliberately shifted toward private companies; Rijkswaterstaat would only have to manage these processes and intervene whenever necessary. According to the former Director-General responsible for this implementation, Rijkswaterstaat would become "*more of a manager, and less an executor; and more of a client, and less a constructor*" (Bijsterveld, 2009). Overall, Rijkswaterstaat launched a new managerial frame with a client–contractor relationship between Rijkswaterstaat and private companies (Figure 3).

Translation of the managerial frame to waterway renewal. The outcomes of the adopted mission were an ambition—being a reliable and cost-effective network manager—that was translated into a strategy that ensures project delivery (action strategy 1, Figure 3). This strategy also becomes apparent in the renewal of waterway assets. Renewing individual assets is executed in distinct projects with limited stakeholder involvement to decrease potential disruptions. In these projects, the scope is dominant. Indeed, Rijkswaterstaat has become a “*real project club*” (#4). As a contract manager of Rijkswaterstaat explains, “*You just have to realize that, in particular in DBFM-contracts, time is sacred. A month of delay can easily cost up to a million euros*” (#3). Rijkswaterstaat is therefore less concerned with strategic considerations with regard to waterway renewal, in which the configuration of hydraulic works—or even complete waterway corridors—is discussed with multiple stakeholders. Rather, the emphasis is put on completing projects in an efficient manner, thus creating an agency that is mostly occupied with the attainment of internal objectives.

In the managerial frame, the new task division between Rijkswaterstaat and the private parties (action strategy 2, Figure 3) created a new playing field, in which both sides had to become familiar with their new roles. Rijkswaterstaat has handed over as many responsibilities as possible to private companies (“the market, unless”), but simultaneously wants to ensure it receives value for money. Handing over responsibilities was expected to come with freedom for private companies. However, according to interviewees from private companies, Rijkswaterstaat “over-controls” their work which impedes their freedom. They feel they have to legitimize every small action in a project. At the same time, Rijkswaterstaat interviewees complain that private companies are unreliable and do not live up to their promises. Because of competitive tendering processes in which companies sign in on very low budgets, they are said by Rijkswaterstaat interviewees to always deliver only the bare minimum, or even less if they see an opportunity to do so. Both parties therefore perceive each other with some degree of distrust. Some interviewees even go as far as calling it a race to the bottom in which both sides try to financially undress each other. As a consequence, waterway renewal projects do not focus so much on the issue of waterway renewal per se, but instead on procedural and contractual issues related to the public–private partnerships within the projects.

A partner frame on renewal

Toward a partner frame (2012–current). Dissatisfied with the distrust created between public and private parties and the dominant project scope, Rijkswaterstaat gradually started an internal reflection regarding the managerial frame. An additional trigger for this reflection was the broader discussion of how to deal with a mature infrastructure network. The redrafted waterway management plan by Rijkswaterstaat (RWS, 2014) acknowledges this challenge: guaranteeing a well-functioning waterway network will be accompanied by higher investments in the upcoming decades. This becomes visible in a growing project portfolio of hydraulic works that need to be replaced. Due to more ageing waterway assets, this portfolio is expanding. For example, in the period between 2012 and 2016, the renewal of six navigation locks had to be prepared; a doubling of water infrastructure projects compared to previous years. Yet, interviewees mention that Rijkswaterstaat has limited capacity for managing the six projects for the navigation locks, in particular in the field of engineering. As an interviewee of Rijkswaterstaat summarizes, “*we were lacking capacity,*

experience, knowledge... And still we had to make sure to do it" (#4). Also, the Ministry has a political ambition to tender the projects with Design, Build, Finance, and Maintain (DBFM) contracts to better employ the private sector's potential. Although Rijkswaterstaat had gained experiences with this in the highway sector, the implementation of DBFM-contracts in water infrastructure projects was considered a challenge. In conclusion, as the Rijkswaterstaat management plan (RWS, 2014) states, waterway projects need to be approached in a novel, smarter way to guarantee project delivery.

Inclined to NPM principles, the provision of infrastructure has become predominantly a procedural question. Thus, the limited personal capacity and the political ambitions of implementing a novel type of contract were regarded as an incentive to operate more efficiently. In the interviews, the importance of learning was stressed: fostering learning between waterway projects was regarded as a means to tackle the limited capacity and to familiarize to the DBFM-contracts. According to interviewees, the six aforementioned

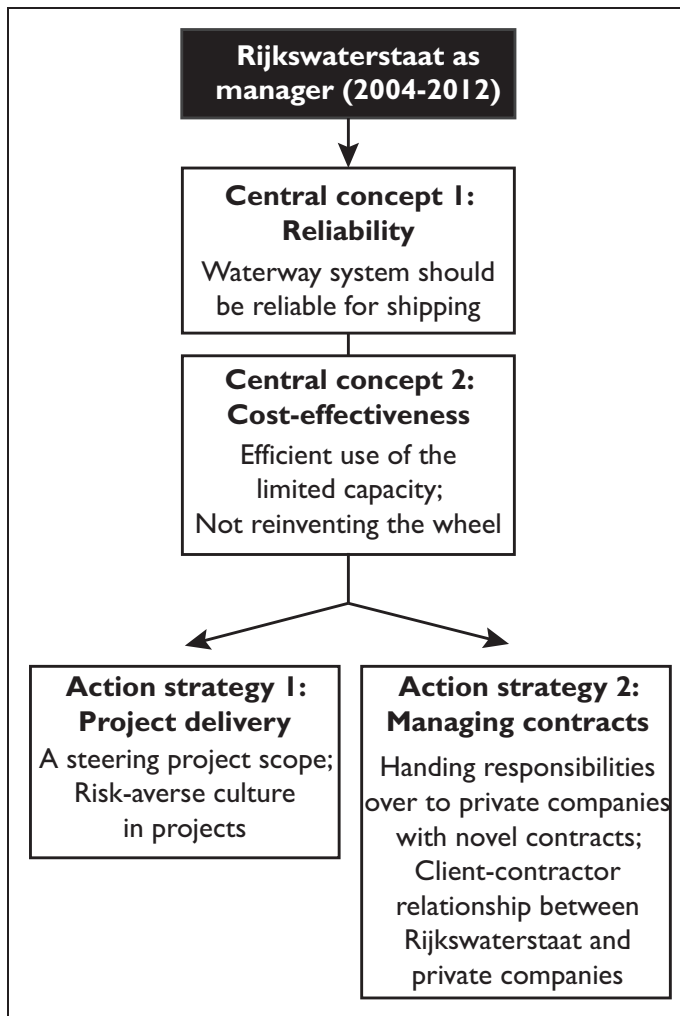


Figure 3. The managerial frame.

projects therefore needed to be executed in conjunction. This idea of unity gave rise to a programmatic structure in which the six projects were bundled: the Program on Navigation Locks (*Sluizenprogramma*) was launched in the fall of 2012. Rijkswaterstaat had successful experiences in other fields with programmatic structures for the mutual approach of several projects at once. A program team staff member explains: “*If you were to approach every project individually, it would cost just too much capacity, time and energy, which can be saved by collectively approaching the projects*” (#12). The emphasis on unity and uniformity, for instance by developing shared procedures on tendering and technical requirements, created a shared commitment “to make it happen.”

The action strategy that the program team had developed echoes the importance of collaboration and joint learning (action strategy 1, Figure 4). The program strategy refers to a “*partnership of projects*” and states that “*by cooperating together and learning from each other, we will maintain and enlarge the knowledge on working in waterway projects*” (RWS, 2015). New internal organizational structures and initiatives were established to put these notions into practice. For example, several platforms, such as a lunch seminar series, were

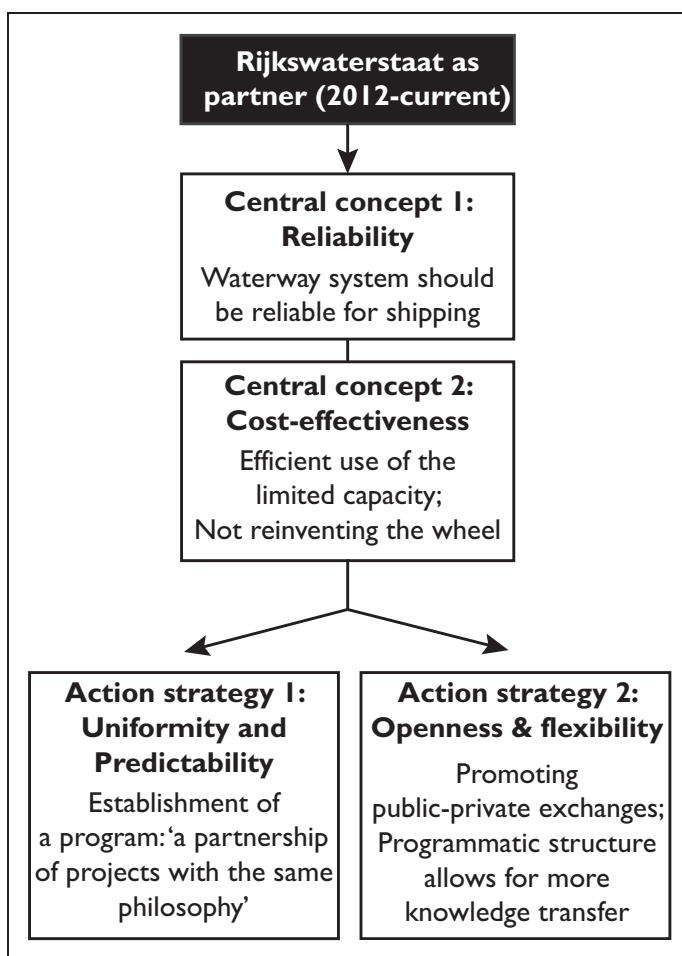


Figure 4. The partner frame.

introduced to allow the exchange of experiences between project members. The project managers also have biweekly meetings to exchange updates. This is all aimed at streamlining the projects and creating a higher degree of uniformity. Furthermore, the program team sequenced the projects based on their size to support the learning process—working from the smaller-scale projects Limmel and Eefde to major works such as the Afsluitdijk and IJmuiden.

The program team also reconsidered public–private cooperation (action strategy 2, Figure 4). The program team was unsatisfied with the situation between public and private companies as sketched in “The rise of the managerial frame (2004–2012)” section. As a result of Rijkswaterstaat’s reflection process, the program team decided to move away from the more hierarchical client–contractor relationship. Whereas previously Rijkswaterstaat and private companies were not that eager to share experiences, the program team argued that sharing experiences would contribute to all six projects. A staff member recalls: “*Our program director stated: ‘I want to do it differently. I want to do it more informally, I want to better know what is going on, and I also want to get to know their [private companies’] experiences.’*” The Dutch construction magazine Cobouw positions this shift as “*less commissioning, but more partnership*” and “*from the ‘market, unless’ towards ‘Rijkswaterstaat &’*” (Koenen, 2015).

To act as a partner, interviewees mentioned central concepts as openness and flexibility, which requires dialogue and conversation with each other. As several interviewees mentioned, that is quite a challenge for both sides. As a representative of the construction companies stated, “*Rijkswaterstaat requested a complete transformation in this program*” (#17). Multiple sessions with private companies were established to support dialogue. The programmatic structure supports this exchange, because it creates consistency and uniformity between projects. A Rijkswaterstaat project manager explains further: “*It has the same philosophy, which is continuously improved on the basis of what we learn with each other*” (#15). The uniformity between projects thus created a predictable setting in which parties know what to expect from each other. Interviewees from the private side seemed to value this new approach. For instance, as a representative organization for market parties explains: “*The brave thing of the program team was that they were very vulnerable: ‘you can discuss everything with us, there is no taboo.’ It all sounded very ambitious*” (#17). Other interviewees state that there is a willingness to talk from both sides and that the meetings help to start a conversation. As such, according to a private company’s bid manager, the open attitude is not only preached but also shown in practice.

The manager frame was therefore gradually replaced with a partner frame (Figure 4). In this reframing process, both Rijkswaterstaat and private company officials refer to openness and flexibility, in which there is room for dialogue. It seems to be a major break with the approach observed in the previous stage, which discouraged exchange between public and private officials. However, Rijkswaterstaat’s ambition has not altered; Rijkswaterstaat interviewees continue to emphasize the agency’s core mission to ensure high reliability and achieve cost-effectiveness. We observe that Rijkswaterstaat has added novel central concepts to its repertoire, but this has not led to a reconstitution of the organization on a higher-level. The newly proposed concepts have modified the action strategy in particular. On the one hand, the programmatic structure helped to ensure project delivery by sharing limited resources and to develop a higher degree of uniformity and predictability. As one interviewee described Rijkswaterstaat as “*not at all a learning organization*” (#4), the program was able to support the learning process between projects. On the other hand, Rijkswaterstaat currently favors a more partnering relationship with private companies, as opposed to a more vertical client–contractor role.

Translation of the partner frame to waterway renewal. Since it is primarily the action strategies that have been altered, the influence of the partner frame on approaching waterway renewal remains limited. This section will discuss the two action strategies in regard to their respective impact on waterway renewal.

First, interviewees argue that uniformity and predictability can support project delivery, which remained the priority. It was expected that a programmatic structure would allow for this. Interviewees did not immediately see the benefits of such a structure, as they were used to work with much independence on specific projects. In the Program on Navigation Locks, all of a sudden they had to co-operate. In the beginning in particular, a staff member recalls, *“everybody felt that it is all very nice what was decided upon there by the program at Rijkswaterstaat’s headquarters, but I have my own agenda here with my project in the region”* (#20). As a Rijkswaterstaat project manager puts it, *“that has been the program’s search: what is the added value of the program and how can we increase this added value? What is our role [as project managers]? That sometimes caused quite some friction”* (#15). Interviewees underscore that the programmatic structure should benefit the delivery of the six projects, for instance through the facilitation of informal cooperation between the projects. This demonstrates the different interests between the project and the program. At first, the project interests were often prioritized. For instance, interviewees mention the initial competition between projects to receive sufficient human resources at the outset of the program. This competition between projects has slightly decreased, as a bid manager from a company observes:

The program director was appointed at a certain moment. Well, “challenging task, you’ve got!” I thought. The program consists of six projects, each with its own strong project manager and contract manager who in principle know exactly how to work and who have their own way of working. I believe that he did a great job bringing them all together and creating one face and one approach. (#21)

Consequently, the program has received increased support. Interviewees mention how the new roles and responsibilities became clearer for them over time, which has led to a programmatic approach in which project delivery remains key. For example, the project teams in the program follow similar tendering procedures and develop comparable technical requirements for each waterway asset. Accordingly, we conclude that a predominantly single-loop learning process has occurred in which the program was added as an additional layer to the already existing project management approach developed in the managerial frame.

The second strategy transformed the relationship with private companies from a more traditional client–contractor relationship toward becoming partners (compare Figures 3 and 4). As a result, it is primarily a different strategy to achieve Rijkswaterstaat’s unchanged mission. In the newly developed partner frame, Rijkswaterstaat actively approaches private companies to better understand their experiences. Interviewees mention that partnering is aimed at a more efficient and reliable way of realizing the renewal projects. Hence, we perceive this shift as single-loop learning as well.

As interviewees state, partnering requires more space for dialogue and willingness to exchange information. These new strategies remain challenging—becoming a partner is far from easy in a competitive environment, such as in tendering procedures. Rijkswaterstaat remains both project initiator and client, so interviewees argue that Rijkswaterstaat will continue to set the standards. In the words of a Rijkswaterstaat project manager, *“we are the big juggernaut and we decide it anyway, we are the dominant party”* (#15). Interviewees from private companies agree with this, like this bid manager: *“We will keep being dependent*

on Rijkswaterstaat. (...) *They will continue to be our client*" (#20). Therefore, interviewees question to what extent openness is realized. This is even more questioned between private parties, which remain each other's competitors, as a representative of private companies confirms: *"They participate to win [the tender] and, to put it bluntly, they will seize each opportunity to try eliminating a competitor"* (#17). This can also be observed in practice: the public-private platform founded to discuss overarching themes congregated only three times, but is currently on hold as companies feared they were becoming too open to their competitors. Consequently, we observe a strong tension between the two frames: having a more vertical client-contractor relationship versus being partners to stimulate the exchange of experiences. Our case study seems at a crossroads in pursuing either one of these two action strategies. The shift in frames aims for a more open, inclusive learning process, yet the learning structures developed in the managerial frame hold back this development. Both Rijkswaterstaat and private parties are struggling to overcome this dilemma and are trying to find an approach that suits both frames.

In our discussion of the refinement of the action strategies, waterway renewal as an issue seems to be rather absent. The refinements are mainly oriented toward Rijkswaterstaat's ambitions of becoming a reliable and cost-effective network manager. The changes demonstrate that internal organizational discussions dominate over discussions regarding the external context of waterway renewal. The renewal challenge is merely translated into an increased amount of projects of which Rijkswaterstaat has to take care. The reconstitution of the managerial frame toward a partner frame thus occurred on a more operational basis.

Hence, we conclude that, in our case study, primarily single-loop learning took place. This implies that a more fundamental reinterpretation of what waterway renewal is, and how it needs to be approached, is lacking. In contrast, it seems that safeguarding the current status quo prevails. Moreover, Rijkswaterstaat interviewees even position re-interpreting renewal outside their responsibility, thus actively avoiding double-loop learning. They stress that they are an executive agency that implements the measures decided upon by the Ministry. Fundamental re-interpretations lead to political discussions that clash with Rijkswaterstaat's frame of a public-oriented network manager. The absence of double-loop learning potentially results in an agency ill-equipped for a changed context.

Discussion: Water authorities dealing with change

Our case study of the water authority of Rijkswaterstaat demonstrates how its core ambition of becoming a cost-effective and reliable public network manager is the *leitmotiv* for developing strategies for waterway renewal. From this perspective, ageing waterway infrastructures become potential threats that can challenge the reliability of the network. As a consequence, being more open to potential, more fundamental changes triggered by waterway renewal (e.g. socio-economic developments and climate change impacts) is regarded as potentially disruptive to Rijkswaterstaat's mission and is therefore avoided. These findings confirm previous research on how executive agencies have become strong in realizing their tasks in particular, which has been strengthened by NPM thought (Eakin et al., 2011; Huntjens et al., 2011). Being executive agencies, water authorities often have clear objectives that need to be achieved, while simultaneously being cut back in size and assigned to operate in a business-like manner. NPM helps to pursue authorities' objectives more effectively and efficiently which, accordingly, underscores their license to operate, in particular in the short-term.

However, waterway renewal is also accompanied by longer-term uncertainty that involves strategic decisions about future waterway configurations. Following from this, change could

also be framed as an inherent condition for public authorities, which calls for different ambitions and strategies that, for instance, take stakeholder collaboration and program adaptation into consideration (cf. Eakin et al., 2011; Rijke et al., 2014). In terms of learning, in addition to improving established action strategies, this requires a reflection on as well as a reformulation of current central concepts. Recent literature on, for instance, more adaptive forms of governance identifies programmatic and collaborative structures, among other things, as beneficial for dealing with change and uncertainty (Busscher, 2014; Rijke et al., 2014). In this context, the notion of continuously learning on different levels is also stressed (Pahl-Wostl, 2009; Van Herk et al., 2015).

In our case study, Rijkswaterstaat acknowledges the importance of anticipating change, since this can severely impact its waterway network. Such change, though, is approached rather pragmatically by taking an instrumental stance in looking at things, because Rijkswaterstaat has, to a great extent, become oriented toward procedural instead of substantive issues (cf. Bevir et al., 2003). For instance, the partner frame has adopted a programmatic structure and specifically aimed at creating more bonding between public and private parties to become more cost-effective. Hence, mainly single-loop learning has occurred: the strategies all aim at a more efficient implementation of waterway renewal projects. To illustrate, whereas programs could give more room for dealing with change (as projects can complement each other), the programmatic structure found in the case study is predominantly a scaled up version of the project structure already in play. Altogether, we observe that change is thus mainly approached as a disturbing element that needs to be controlled instead of embraced. Because of the dominance of NPM, anticipating waterway renewal therefore mainly resulted in a refinement of action strategies and ignored a critical reflection on central concepts existing in the dominant frame.

Conclusions

Water authorities increasingly acknowledge the challenge of dealing with waterway renewal. The central aim of our article was to gain understanding of the organizational learning process, which public agencies follow to align themselves to this new context of waterway renewal. Organizational learning becomes crucial for alignment which requires single-loop learning (improving existing practices) as well as double-loop learning (reconsidering dominant frames and values). Analyzing this organizational learning process consequently provides a better understanding of how agencies anticipate change, in which agencies maneuver between becoming, on the one hand, effective and efficient and, on the other hand, adaptive and flexible (Bosomworth, 2015; Eakin et al., 2011). We examined this by performing a case study into the Dutch national water authority Rijkswaterstaat and specifically its Program on Navigation Locks to analyze water infrastructure renewal in practice.

In our case study, the repositioning from a managerial toward a partner frame mainly resulted in single-loop learning in order to enable alignment to waterway renewal. Rijkswaterstaat introduced new action strategies, such as programmatic structures, but its central concepts in the frame (cost-effectiveness and reliability) remained the same. Although the changed context was acknowledged, the incorporation of new elements was primarily driven by effectiveness and efficiency aims that are in line with existing frames (cf. Van den Brink, 2009). It raises the question to what extent the water authority of Rijkswaterstaat is fully aligning itself to water infrastructure renewal.

We conclude that, for executive agencies anticipating long-term uncertainties, solely refining existing practices might not be sufficient. To improve alignment to waterway

renewal, authorities can be stimulated to encourage the questioning of dominant frames as well as to construct a new narrative in which the implications of waterway renewal are more thoroughly recognized and addressed. This entails frame reflection and the introduction of new central concepts, in addition to concepts such as cost-effectiveness and reliability. In this context, room should especially be provided for the incorporation of more adaptive concepts and strategies to account for the uncertainties surrounding waterway renewal.

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Notes

1. As Cope (2003) notes, the dualistic conceptualization of single-loop versus double-loop learning is also expressed by other authors in similar ways, yet with different terms. Most notable examples include “adaptive” and “generative” learning in the literature on the “learning organization” (e.g. Senge, 1990), and “instrumental” and “transformational” learning in the adaptive management literature (e.g. Pahl-Wostl, 2009).
2. All quotes from the interviewees were told in Dutch and are translated into English by the first author. The number after each interview corresponds with the numbers in Table 1, Appendix 1.

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Appendix I

Overview of gathered data

Table 1. List of interviewees.

	#	Function	Company	Date
Interviews (Round 1)	1	Engineering manager	Rijkswaterstaat	07 Jan 2014
	2	Project manager construction company	BAM Civil	09 Jan 2014
	3	Contract manager	Rijkswaterstaat	09 Jan 2014
	4	Program director	Rijkswaterstaat	21 Jan 2014
	5	Consultant		21 Jan 2014
	6	Chairman	Topsector Water	25 Jan 2014
	7	Secretary	Topsector Water	25 Jan 2014
	8	Director construction company	Heijmans	04 Feb 2014
	9	Program manager knowledge	Rijkswaterstaat	11 March 2014
	10	Senior official engineering	Rijkswaterstaat	15 Apr 2014
Interviews (Round 2)	11	Senior official engineering	Rijkswaterstaat	15 Apr 2014
	12	Program advisor	Rijkswaterstaat	27 May 2015
	13	Project manager	Rijkswaterstaat	27 May 2015
	14	Program advisor	Rijkswaterstaat	02 June 2015
	15	Project manager	Rijkswaterstaat	02 June 2015
	16	IT advisor	Rijkswaterstaat	03 June 2015
	17	Representative construction companies	Bouwend NL	15 June 2015
	18	Director Rijkswaterstaat	Rijkswaterstaat	24 June 2015
	19	Program manager	Rijkswaterstaat	24 June 2015
	20	Bid manager construction company	VanOord	29 July 2015
	21	Bid manager construction company	Volker	08 July 2015
	22	Bid manager construction company	BESIX	04 Aug 2015

Table 2. Meetings visited for participatory observations.

#	Meeting	Location	Date
1.	Program team meeting	Rijkswaterstaat, Utrecht	20 May 2015
2.	"After lunch" session (program + project)	Rijkswaterstaat, Utrecht	20 May 2015
3.	Program team meeting	Rijkswaterstaat, Utrecht	03 June 2015
4.	Platform Navigation Locks (Community of Practice with private companies)	Beatrix sluices, Nieuwegein	03 June 2015
5.	Market consultation project Eefde	Rijkswaterstaat, Utrecht	05 June 2015
6.	Program team meeting	Rijkswaterstaat, Utrecht	01 July 2015
7.	Program team meeting	Rijkswaterstaat, Utrecht	29 July 2015
8.	Program team meeting	Rijkswaterstaat, Utrecht	26 Aug 2015
9.	Program team meeting	Rijkswaterstaat, Utrecht	13 Jan 2016
10.	Program team meeting	Rijkswaterstaat, Utrecht	27 Jan 2016
11.	Program team day ("day of reflection")	De Lantaern, Nieuwegein	17 Feb 2016
12.	Program team meeting	Rijkswaterstaat, Utrecht	24 Feb 2016
13.	Program team meeting	Rijkswaterstaat, Utrecht	06 Apr 2016

Table 3. Documents and articles used to triangulate our findings.

#	Publisher	Title
1.	Rijkswaterstaat	Rijkswaterstaat: hold on knowledge? On a repositioning of the knowledge function of Rijkswaterstaat as an agency of the Ministry of Traffic & Public Works
2.	Rijkswaterstaat	Business plan 2015: One Rijkswaterstaat, each day better!
3.	Rijkswaterstaat	Program strategy Navigation Locks (internal document)
4.	Rijkswaterstaat	Maintenance and development plan for the national waters 2016–2021 [draft]
5.	Ministry of Infrastructure & the Environment	Strategic vision Infrastructure & the Environment. The Netherlands competitive, accessible, liveable and safe
6.	Building Business	Interview “Bert Keijts, Rijkswaterstaat: Quality, user-friendliness and sustainability are the most important selection criteria in tenders”
7.	Cobouw	Opinion “For Rijkswaterstaat co-creation is the future” (9 Oct 2013)
8.	Cobouw	News item “Constructors drop out massively in the Program on Navigation Locks” (13 March 2015)
9.	Cobouw	News item “From ‘RVWS market unless’ to ‘RVWS &’” (15 May 2015)
10.	NRC Handelsblad	News item “Largest navigation lock in IJmuiden for a rather ‘tiny’ budget” (26 Feb 2016)